

# PATENT ABSTRACTS OF JAPAN

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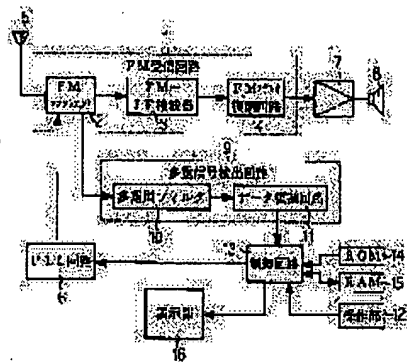
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## (54) DISPLAY DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To make a character easy to read by reducing unnecessary space in a display device in which the character data of 15.5 characters × 2 lines of an FM multiplex broadcasting as it is can not be displayed because a display part is small, the characters of 15.5 characters × 2 are made one line and a scroll is performed.

**SOLUTION:** In the display device having a display part 16 and a control circuit 13 displaying the character data of plural lines on a display part 16 by the scroll of a line, the control circuit 13 performs a scroll display by reducing the number of space when plural of space exist in the coupled part of the line. Or, when space exists in the coupled part of the line, the control circuit 13 investigates the continuity of the coupled part, deletes the space if the continuity exists and performs the scroll display.



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CLAIMS

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[Claim(s)]

[Claim 1] It is the display which the aforementioned control circuit lessens the number of spaces in the display which has the control circuit which displays the alphabetic data of a multi-line on a display and this display by scrolling of one line when two or more spaces are in a part for the bond part of a line, and is characterized by indicating by scrolling.

[Claim 2] It is the display characterized by deleting the aforementioned space and indicating by scrolling if the continuity for the aforementioned bond part is investigated and there is continuity when the aforementioned control circuit has a space in a part for the bond part of a line in the display which has the control circuit which displays the alphabetic data of a multi-line on a display and this display by scrolling of one line.

[Claim 3] It is the display characterized by inserting the character which shows that there will not be a space or continuity in a part for the aforementioned bond part if the aforementioned control circuit investigates the continuity for the aforementioned bond part and there is no continuity when there is no space in a part for the bond part of a line in the display which has the control circuit which displays the alphabetic data of a multi-line on a display and this display by scrolling of one line, and indicating by scrolling.

[Claim 4] It is the display which investigates whether the character which is not a space for a bond part is a particle when the aforementioned control circuit has a space in a part for the bond part of a line in the display which has the control circuit which displays the alphabetic data of a multi-line on a display and this display by scrolling of one line, and is characterized by deleting the space for the aforementioned bond part and indicating by scrolling if it is a particle.

[Claim 5] It is the display which investigates whether the character which is not a space for a bond part is a punctuation when the aforementioned control circuit has a space in a part for the bond part of a line in the display which has the control circuit which displays the alphabetic data of a multi-line on a display and this display by scrolling of one line, and is characterized by deleting the space for the aforementioned bond part and indicating by scrolling if it is a punctuation.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the display which performs a scrolling display.

[0002]

[Description of the Prior Art] The FM multiplex broadcast carried out based on the Ministry of Posts and Telecommunications notification No. 461 is a broadcast system which carries out multiplex [ of a character, figure information, the additional information, etc. ] to the crevice between the electric waves of FM voice broadcast, and offers new service (refer to JP,3-6926,A). There is display information, such as news, a weather report, a complement program, a music program, traffic information, and urgent broadcast, in this, and the information for which it wishes can be chosen and displayed on it.

[0003] The alphabetic data of the above-mentioned FM multiplex broadcast was displayed on the display which can display a character by lighting of Light Emitting Diode etc., and it was possible that the information on news or a weather report is offered in the street, or in the road reports traffic information.

[0004]

[Problem(s) to be Solved by the Invention] The character transmitted by the FM multiplex broadcast is 15.5 character x2 line in the size of the standard character (full size). However, there are some which cannot perform the display of 15.5 character x2 line in the pocket device which cannot have a big screen display in restrictions of a display or a keyboard installed in \*\* et al., a street, a passage, etc. For example, with the display of 8 character x1 line, how to make one line scroll by carrying out the character of 15.5 character x2 line can be considered. However, the data of an FM multiplex broadcast will stop easily being able to digest the meaning of a character which indicated by scrolling by one line, if the two-line simultaneous display is not a thing corresponding to the scrolling display because of the premise or the meaning of a passage of one line and two lines has been independent conversely. Moreover, if the 2nd line is connected with the 1st line, when a large number [ a null ], it will be hard coming to read into the connected portion in the case of scrolling. For example, when having displayed in the center of the 2nd line with the number of characters which does not fill one line with the content relevant to the 1st line like drawing 4 , if it is made to scroll, many nulls will go into the portion to which the 2nd line is connected with the 1st line, and it will be hard to read.

[0005]

[Means for Solving the Problem] this invention was made in view of this point, and in the display which has the control circuit which displays the alphabetic data of a multi-line on a display and this display by scrolling of one line, the 1st feature is lessening the number of spaces and indicating by scrolling, when the aforementioned control circuit has two or more spaces in a part for the bond part of a line.

[0006] The 2nd feature will be deleting the aforementioned space and indicating by scrolling, if the aforementioned control circuit investigates the continuity for the aforementioned bond part and has continuity, when a space is in a part for the bond part of a line.

[0007] The 3rd feature will be inserting the character which shows that there is not a space or continuity in a part for the aforementioned bond part, and indicating by scrolling, if the aforementioned control circuit investigates the continuity for the aforementioned bond part and does not have continuity, when there is no space in a part for the bond part of a line.

[0008] When the aforementioned control circuit has a space in a part for the bond part of a line, the character which is not a space for a bond part investigates whether it is a particle, and if the 4th feature is a particle, it is deleting the space for the aforementioned bond part and indicating by scrolling.

[0009] When the aforementioned control circuit has a space in a part for the bond part of a line, the character which is not a space for a bond part investigates whether it is a punctuation, and if the 5th feature is a punctuation, it is deleting the space for the aforementioned bond part and indicating by scrolling.

[0010]

[Embodiments of the Invention] The gestalt of the 1st example of this invention is explained based on drawing. Drawing 1 is the block diagram showing the composition of the display of this invention. This FM multiplex broadcast is based on the Ministry of Posts and Telecommunications notification No. 461.

[0011] (1) is FM receiving circuit and it consists of FM front end (2), a FM-IF wave detector (3), and an FM stereo demodulator circuit (4). FM front end (2) amplifies the signal received from the antenna (5), considers as a RF signal, mixes a RF signal and the oscillation signal from a PLL circuit (6), and outputs an intermediate frequency signal. A FM-IF wave detector (3) performs FM detection to the intermediate frequency signal outputted from FM front end (2). FM stereo demodulator circuit (4) reproduces L channels and R channel signal using the stereophonic composite signal inputted from the FM-IF wave detector (3), and outputs each channel signal. The signal outputted from FM stereo demodulator circuit (4) is amplified by the amplifying circuit (7), serves as voice from a loudspeaker (8), and is outputted.

[0012] (9) is a multiple-signal detector and it consists of a filter for multiplex (10), and a data demodulator circuit (11). The filter for multiplex (10) removes a sound signal and a noise component from the output signal of FM front end (2), and extracts the LMSK (Level controlled Minimum Shift Keying) signal by which multiplex is carried out to 76kHz. LMSK is a modulation technique which controls the size of a multiple signal according to the size of a stereo sound signal. A data demodulator circuit (11) restores to a LMSK signal to a displayable-data signal. Processing of a block unit and a frame unit performs synchronous reproduction and error correction for the signal from the filter for multiplex (10). An end of synchronous regeneration and error correction processing of a block unit sends out the signal which notifies this to the below-mentioned control circuit (13). An end of synchronous regeneration and error correction processing of a frame unit sends out the signal which notifies this to the below-mentioned control circuit (13). Moreover, a data demodulator circuit (11) detects the program number which distinguishes the content of display information, and sends out this signal to a control circuit (13).

[0013] (12) is a control unit and is connected to the below-mentioned control circuit (13). (13) is a control circuit and controls each part based on a control unit (12) and a multiple-signal detector (9). (14) is ROM and memorizes the program which operates a control circuit (13). (15) is RAM and memorizes data required for operation of a control circuit (13), such as an alphabetic data of the multi-line which received. (16) is a display and displays frequency or time of the character of the menu information on an FM multiplex broadcast, or display information, or an AM/FM broadcasting station etc. Total characters on screen are 8 character x1 line.

[0014] By the above composition, this display can detect and display the alphabetic data by which multiplex was carried out on the crevice between electric waves. However, \*\* et al. and a display are 8 character x1 lines, and cannot display the 15.5 character x2 line of an FM multiplex broadcast as it is. Then, a control circuit (13) makes End RAM (15) memorize the detected alphabetic data of 15.5 character x2 line. And read this, the character of the 2nd line is made to connect with the 1st line, and RAM (15) is made to memorize as a character of one line. This character made to connect is read and it

is made to display on the display of eight characters one by one by scrolling.

[0015] Processing of the space of the joining segment in the case of making the character of the 2nd line connect with the 1st line is explained. Drawing 2 is a flow chart which shows this operation of a control circuit (13). Drawing 3 is drawing showing the example of a display.

[0016] First, it investigates whether a space is located at the end of the 1st line, or the 2nd line head (S1). If there is no space, the head of the 2nd line will be connected with the end of the sentence of the 1st line as it is (S2). If there is a space at Step S1, it will investigate whether they are the characters (\*\* etc.) in which the character in the end of the 1st line except a space is used for a particle (S3). If it is not the character used for a particle, the space for the half size of one character will be put in between the end of the sentence of the 1st line, and the head of the 2nd line (S4). That is, even if there is a space where plurality continued like the reception A of drawing 3, since it becomes one space, it becomes a readable scrolling display. In addition, you may transpose to the character which shows that there is no continuity, such as "/", instead of this one space.

[0017] If it is the character used for a particle at Step S3, it will investigate whether the character in front of the character is a kanji or a sign (S5). The space for the half size of one character is put in between the end of the sentence of the 1st line, and the head of the 2nd line noting that possibility of being a particle is not high, when it is not a kanji or a sign, either. If it is a kanji or a sign at Step S5, like Reception B and Display B of drawing 3, the character of the end of the sentence of the 1st line except a space will delete a space noting that it is a particle, and will connect the head of the 2nd line with the end of the sentence of the 1st line (S6).

[0018] A particle shows the relation between a word and a word, and when indicating one line, not putting in a space after a particle tends to read it.

[0019] Moreover, when a punctuation also indicates one line, it is easy to read the direction into which a space is not put after that. Therefore, when a space is in a part for the bond part of a line like Reception C and Display C of drawing 3, it investigates whether the character which is not a space for a bond part is a punctuation, and as long as it is a punctuation, the space for the aforementioned bond part may be deleted and it may indicate by scrolling.

[0020] Thus, a particle and a punctuation investigate the continuity for a bond part, and an unnecessary space is deleted. Moreover, what is necessary is just to insert conversely, the character which shows that there is no continuity, such as a space and "/", in a part for a bond part, when there is no continuity in a part for a bond part. That is, as long as it puts in the step which investigates continuity and continuity is between Step S1 and Step S2, as long as there is no continuity, you may be made to progress to step S4 to Step S2.

[0021] In addition, although the alphabetic information of an FM multiplex broadcast was used for the example in order that a space might enter in many cases on a layout, this invention is applicable to other display which connects the character of a multi-line with one line.

[0022]

[Effect of the Invention] Since the display is small, the alphabetic data of 15.5 character x2 line of an FM multiplex broadcast cannot be displayed as it is, but the scrolling display which is easy to read by deleting an unnecessary space can be performed in display [ make / scroll by carrying out the character of 15.5 character x2 line / one line ].

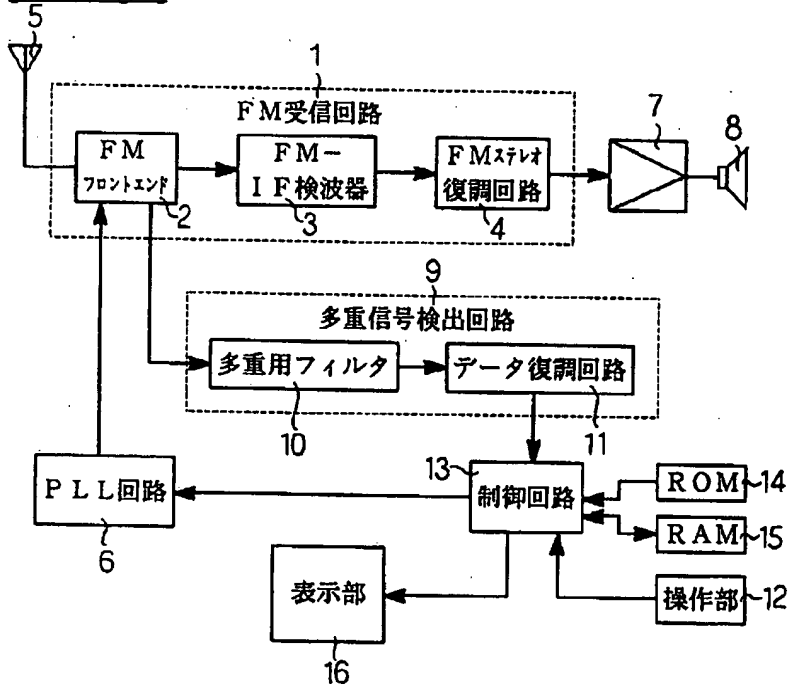
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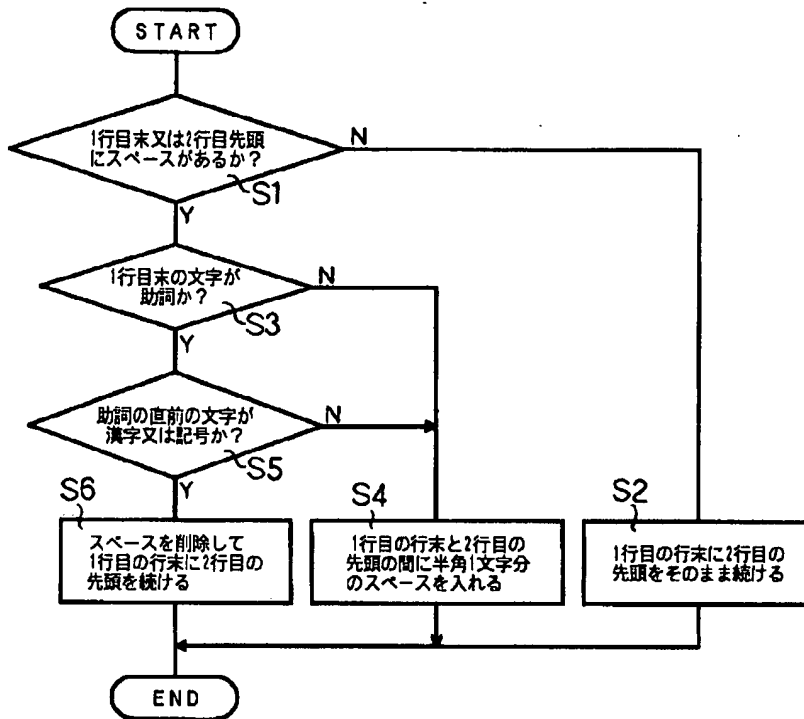
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Drawing 3]

【受信A】

全角15.5文字															
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	
0	0	0	県	東	部										
▷	は	れ		の	ち									◁	
▷	く	も	り											◁	

【表示A】 ← 00県東部 はれ のち くもり

【受信B】

全角15.5文字															
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	
▷	毎	日	こ	の	時	間	は							◁	
▷	東	京	発	ト	レ	ン	ド	情	報	で	す			◁	

【表示B】 ← 毎日この時間は東京発トレンド情報です

【受信C】

全角15.5文字															
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	
▷	毎	日	こ	の	時	間	は							◁	
▷	東	京	発	ト	レ	ン	ド	情	報	で	す			◁	

【表示C】 ← 毎日この時間は、東京発トレンド情報です

[Drawing 4]

← 全角15.5文字 →  
| 0 1 2 3 4 5 6 7 8 9 A B C D E |  
[受信A] ▷ ○ ○ 県 東 部 ◁  
▷    は れ   の ち   く も り ◁

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[表示A] ← ○ ○ 県 東 部                      は れ   の ち   く も り

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← 全角15.5文字 →  
| 0 1 2 3 4 5 6 7 8 9 A B C D E |  
[受信B] ▷ 毎 日 こ の 時 間 は ◁  
▷    東 京 発 ト レ ン ド 情 報 で す ◁

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[表示B] ← 毎 日 こ の 時 間 は                      東 京 発 ト レ ン ド 情 報 で す

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[Translation done.]